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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/575,237	05/22/2000	Hiroyuki Akashi	P00,0483	1992
26263	7590	12/15/2004	EXAMINER	
SONNENSCHN NATH & ROSENTHAL LLP P.O. BOX 061080 WACKER DRIVE STATION, SEARS TOWER CHICAGO, IL 60606-1080			CHANEY, CAROL DIANE	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/575,237

**Applicant(s)**

AKASHI ET AL.

**Examiner**

Carol Chaney

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Claim Rejections - 35 USC § 103***

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pandalwar et al., US Patent 5,716,421 with evidence shown by Spotnitz et al., US Patent 6,322,923 and Gies et al., US Patent 5,665,265.

Pandalwar et al. disclose a battery which includes a lithium intercalation material cathode (14), a carbon anode (12) and an electrolyte system (26). (Note column 3, lines 24-40 and 51-64.)

The "electrolyte system" disclosed by Pandalwar et al. includes an inert phase (28) which is equivalent to applicants "separator". Pandalwar further discloses absorbing phases (30, 32) comprising a mixture of a polymer and a swelling solvent. These absorbing phases are equivalent to applicants' solid electrolyte. The inert phase disclosed by Pandalwar et al. may include porous polyolefins such as polyethylene or polypropylene. (Note column 4, lines 33-41.) As shown in Pandalwar Figure 2, layers 70 and 72 of the electrolyte system are absorbing or gel forming polymers. These absorbing or gel-forming polymers disclosed by Pandalwar et al. are identical to the "solid electrolyte" disclosed by the applicants. Both applicants and Pandalwar describe electrolytes which comprise a mixture of a polymer and a swelling solvent. Pandalwar describes a gel or solid polymer electrolyte which includes a polymer such as polyvinylidene fluoride (PVDF), (column 4, lines 42-58) and a solvent (a swelling solvent) which may be propylene carbonate (PC), ethylene carbonate (EC), diethyl carbonate (DEC), dimethyl carbonate (DMC), dipropylcarbonate dimethylsulfoxide, acetonitrile, dimethoxyethane, tetrahydrofuran, n-methyl-2-pyrrolidone (NMP), or

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acetone. (column 4, lines 9-14.) Because Pendalwar discloses a wide range of possible polymers which may be used in the invention, the disclosure of polyvinylidene fluoride is interpreted to include commercially available polyvinylidene fluoride/hexafluoropolypropylene copolymers such as Hylar, KF, Kynar and Kynar Flex polymers.

When the battery system taught by Pendalwar et al. is heated above a threshold temperature, (135 °C for polyethylene) one or more of the polymer support structure layers (54, 56, 58 of Fig. 2) will melt, thereby cutting off ionic conductivity in the battery. The battery impedance is therefore higher at 135 °C than it is at room temperature. (Note Figure 5.)

The disclosure of Pendalwar et al. differs from applicants' invention in that Pendalwar et al. do not recite specific thicknesses or porosities of the porous separator or the solid electrolyte. However, one of ordinary skill in the art would recognize separator thicknesses between 5 and 15 microns and porosities between 25 and 60% to be conventional in the art, as evidenced by Spotnitz et al., US Patent 6,322,923, column 2, lines 26-52. In one embodiment, Pendalwar et al. disclose solid electrolyte layers formed by "dip coating" (column 5, lines 51-53.) A specific thickness of the coating is not discussed. However, one of ordinary skill in the art would recognize dip coated thicknesses of about 5 microns to about 19 microns to be conventional in the art, as evidenced by Gies. Gies discloses 20 micron thick dip-coated PVDF layers in a battery electrolyte/separator system. (See Gies, column 4, lines 47-48.) Further, one of ordinary skill in the art would understand electrolyte thickness to be well-known as a

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result effective variable, as electrolyte resistance increases with electrolyte thickness. Claims that differ from the prior art only by slightly different (non-overlapping ) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. See *In re Woodruff*, 16 USPQ2d 1935,1937 (Fed. Cir. 1990.) See also *In re Huang*, 40 USPQ2d 1685 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art).

The disclosure of Pandalwar differs from applicants' invention in that Pandalwar does not recite a specific ratio of polymer to solvent in the electrolyte systems disclosed by Pandalwar. However, applicants' invention would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would recognize the ratio of polymer to solvent will effect the solubility and gelation of the polymer with solvent. Thus, the ratio of polymer to solvent is a result-effective variable. The discovery of the optimum of a result effective variable in known process is ordinarily within the skill of art. See, for example, *In re Boesch*, 205 USPQ 215 (CCPA 1980)

### ***Response to Arguments***

Applicant's arguments filed 29 September 2004 have been fully considered but they are not persuasive. Applicants' assert their invention is patentable over the prior art of Pandalwar (with evidence provided by Spotnitz et al.) because Pandalwar does not teach or suggest a solid electrolyte battery with a solid electrolyte thickness of between

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5 microns and 19 microns. In response, it is noted that both the applicants' and the prior art disclose solid electrolyte batteries having an anode and a cathode, with a separator and a electrolyte comprised of a polymer and a swelling solvent between the two electrodes. As discussed in earlier office actions, both the prior art and the applicants disclose similar battery materials. The instant invention and the prior art differ in the thickness of electrolyte layer used in the batteries. Applicant asserts Pendalwar teaches a "conventional gel electrolyte layer thickness of between 75 and 25 microns", compared with the 5 to 19 micron thickness of the instant invention. Thus, applicants assert a patentable distinction exists between a 19 micron thick solid electrolyte layer and a 25 micron thick layer of the similar electrolyte. However, both the prior art and the inventive layers are used for the same purpose in similar batteries, and one of ordinary skill in the art would easily understand the effects of changes in electrolyte thickness, (ie electrolyte resistance increases with increase in electrolyte thickness), the invention as a whole would have been obvious to one of ordinary skill in the art.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol Chaney whose telephone number is (571) 272-1284. The examiner can normally be reached on Mon - Fri 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

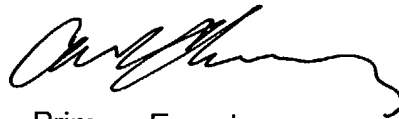
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Carol Chaney

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A handwritten signature in black ink, appearing to read 'Charles H. ...', is written over the printed name of the Primary Examiner.

Primary Examiner  
Art Unit 1745

13 December 2004